

A REVISION OF THE FLOWER-LIVING
GENUS *ODONTOTHRIPS* AMYOT & SERVILLE
(THYSANOPTERA : THIRIPIDAE)



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SYNOPSIS

The genus *Odontothrips* Amyot & Serville is redefined and a key to 21 species is provided; four nominal species and one nominal variety cannot be recognized satisfactorily at present. One former variety (*retamae*) is here regarded as a distinct species, and one species (*ignobilis*) is removed from synonymy (with *meridionalis*). The male phallic armature is described for 13 species and this character is used in species-recognition for the first time in the Terebrantian Thysanoptera. Notes are given on the life histories, and maps of the known distribution are provided. A table is given showing the relationships between the species-groups of *Odontothrips* and the tribes of Papilionaceae.

INTRODUCTION

SPECIES of the genus *Odontothrips* are typical flower-feeding Thripidae ranging in size from 1.3 mm to 2.0 mm. All but two of these species are Palaearctic and the majority feed in the flowers of Papilionaceae. Probably all species cause superficial damage to the flowers in which they feed, but *confusus* is the only known pest. It is quite likely that they act as cross-pollinating agents for their hosts as the present author has observed pollen adhering to numerous individuals. The adults are always macropterous and fly readily in warm weather. Due to their small size however it is unlikely that they are able to fly actively from flower to flower. The monophagous species are univoltine as a result of the limited flowering period, but polyphagous species are apparently multivoltine if conditions are favourable.

Thirty-four nominal species and three nominal varieties of *Odontothrips* have been described but only twenty-five are here regarded as valid species and one variety cannot be satisfactorily recognized. This study began in an attempt to find stable diagnostic characters for certain closely related British species, of which the females

could not be identified readily using existing keys, i.e., those of Morison (1948) and Priesner (1964). It was found that the male genitalia are significantly different between species. These studies were therefore extended to include the World species. Unfortunately nine species are known from females only and no males of a further two species were available for examination. It is hoped that this study will stimulate further collecting and examination of males, particularly of those species which are known from females only.

ACKNOWLEDGEMENTS

I should like to thank Mr E. R. Speyer, who first drew my attention to the differences between the male genitalia of certain species; Prof. Dr H. Priesner, Dr G. D. Morison, Dr R. zur Strassen, Dr L. J. Stannard, and Miss K. O'Neill, who kindly lent material; and Mr L. A. Mound for his advice and criticism.

MATERIAL STUDIED

Unless stated to the contrary all material examined is deposited in the British Museum (Natural History), London (BMNH). The following abbreviations have been used for other depositories: INHS, Illinois Natural History Survey, Urbana; SMF, Senckenberg Museum, Frankfurt; USNM, United States National Museum, Washington.

HOST RELATIONSHIP AND DISTRIBUTION

Twenty-one of the twenty-five species of *Odontothrips* are found in Europe and North Africa, and of these seventeen are known to occur in the flowers of Papilionaceae. *O. pictipennis* is apparently indigenous to North America, feeding in the flowers of plants such as violets and strawberries, although Morgan (1913) recorded specimens from *Acacia*. *O. moerens* is known only from West Africa. These two non-Palaeartic species do not have the sense cone on the sixth antennal segment greatly enlarged at its base. The distribution of the Palaeartic species is shown in Maps 1-5, and has been compiled from the data of the material examined. Published records have been ignored, except those of type-material, because of the confusion over the identity of many species. Recorded distribution is discussed later under each species. Due to the paucity of records, the distribution maps of many species reflect not only those localities in which species occur but also the distribution of thysanopterists in Europe, i.e., Morison in Scotland, von Oettingen in Germany, and zur Strassen in the Canary Islands.

No host-records are known for *elbaensis* and *paraconfusus*. A further two species, known from single records only, from plants other than Papilionaceae are *phlomidinus* on *Phlomis* (Labiatae) and *edentulus* on *Tilia* (Tiliaceae). Like other species of the genus, it is quite conceivable that these four species also feed in the flowers of Papilionaceae.

Table 1 shows the relationship between the Palaeartic species and their respective Papilionaceae hosts. For the purpose of this table the thrips are arranged in groups of species with similar fore limbs and the host-genera are arranged in tribes after Clapham, Tutin & Warburg (1962) and Baker (1926). It is

TABLE I Host plants of some *Odontothrips* species.

	Distal fore tarsal segment with small hooks or tubercles.									Distal fore tarsal segment without small hooks or tubercles.							
	<i>biuncus</i>	<i>loti</i>	<i>karnyi</i>	<i>retamae</i>	<i>ignobilis</i>	<i>meridionalis</i>	<i>meliloti</i>	<i>villetta</i>	<i>ononidis</i>	<i>cytisi</i>	<i>ulicis</i>	<i>phaleratus</i>	<i>intermedius</i>	<i>aemulans</i>	<i>confusus</i>	<i>dorycnii</i>	<i>viciae</i>
Number of stout tibial claws	2	1	0	0	0	0	0	0	0	2	2	1	1	0	0	0	1
GENISTEAE																	
<i>Spartium</i>	.	.	×	.	.	×											
<i>Lupinus</i>	.	.	×														
<i>Genista</i>	.	.	×	×													
<i>Cytisus</i>	×								
<i>Ulex</i>	×	×							
<i>Adenocarpus</i>	.	.	.	×													
<i>Spartocytisus</i>	.	.	.	×													
<i>Retama</i>	.	.	×	×													
GALEGEAE																	
<i>Astragalus</i>	×									
<i>Sesbania</i>	.	.	×														
<i>Acacia</i>	.	.	×														
PHASEOLEAE																	
<i>Cajanus</i>	.	.	×														
TRIFOLIEAE																	
<i>Ononis</i>	.	×	×								
<i>Medicago</i>	×		
<i>Melilotus</i>	×										
<i>Trifolium</i>	.	×															
LOTEAE																	
<i>Anthyllis</i>	.	×															
<i>Lotus</i>	.	×															
<i>Dorycnium</i>	×
VICIEAE																	
<i>Vicia</i>	×	×	.	×	.	.	×
<i>Lathyrus</i>	×	×				

not suggested that these *Odontothrips* species-groups are natural. However, certain groups of species, i.e., *ulicis* and *cytisi* do have similar fore limbs and genitalia and feed on closely related hosts. In contrast some species with similar genitalia have different fore limbs, i.e., *biuncus* with two stout tibial claws, *loti* with one stout claw, and *karnyi* without stout tibial claws. These three species occur on different tribes or groups of tribes of host-plant. It is therefore conceivable that the fore limb has become adapted in relation to the respective host,

but not all species occurring on the same host-tribes have similar fore limbs. Clearly the host is not the only influencing factor, although there does appear to be a relationship between the structure of the fore limb and the host.

The *ignobilis* group of species appears to be associated with the tribes Genisteae, Phaseoleae, Galegeae and Trifolieae; the *aemulans* and *loti* groups with the tribes Trifolieae, Loteae, and Viciae; the *phaleratus* and *viciae* groups with the tribe Viciae; and the *ulicis* group with the Genisteae. Further it would appear that the species-groups *biuncus*, *phaleratus*, *aemulans* and *viciae* are associated with herbs, and the *ignobilis* and *ulicis* groups with larger shrubs.

The distribution of *ignobilis* in England, Wales, the Channel Islands, France, Spain and Portugal follows closely the distribution of *Ulex minor*, one of its hosts; *Ulex gallii*, an alternative host of *ignobilis*, occurs in England, Wales, Ireland, the Channel Islands, North West France and North West Spain. One might reasonably expect to find *ignobilis* on *Ulex gallii* in Ireland or from North West France on either of its hosts.

Apart from a single record from France, *ulicis* is apparently unknown outside the British Isles, although its host *Ulex europaeus* is found throughout Western Europe. Similarly the host of *cytisi* (*Cytisus*) occurs throughout Western Europe although *cytisi* is known only from Scotland and Norfolk. Climatic factors obviously to some extent influence the range of these two species of *Odontothrips* but it is quite probable that both occur in Scandinavia.

LIFE HISTORY

Morison (1928), Orbtel (1963) and Bournier & Khochbav (1965) give accounts of the life histories of named species of *Odontothrips*. Most species feed exclusively in the flowers of Papilionaceae as discussed above. Some monophagous species such as *meliloti*, *cytisi* and *ulicis* are apparently univoltine in the British Isles (Morison, 1928). The polyphagous species *loti* is apparently multivoltine in Central Europe (Orbtel, 1963). The eggs are laid in a cut made by the female with her saw-like ovipositor in the epidermis of the flower (Bournier & Khochbav, 1963). The present author has examined an egg reputedly of *meliloti* in the sepal of *Sarothamnus*. The eggs of *confusus* hatch within seven to nine days (Bournier, 1965).

As in all thrips there are two active larval instars. The first and second instars of *ulicis* and *cytisi* feed in the flowers of *Ulex europaeus* and *Cytisus scoparius* respectively. The injury which they cause appears as a silvery sheen on the staminal sheath, but apparently only the superficial cells are damaged and the host does not suffer any serious effects (Morison, 1928). The mature second instar larvae pass to the ground to complete their metamorphosis.

Bournier & Khochbav (1965) records *confusus* as a pest of lucerne in France, causing 30% of the flowers of infested plants to droop, and decreasing the number of flowers which are likely to be pollinated by bees. The first instar larvae of *confusus* moult after five to six days. The second instar larvae pass to ground after fifteen to eighteen days. They descend to a depth of about twenty-five centimetres, where they remain until the following April. Pupation takes place in the ground and the adults emerge a few days later.

The second instar larvae of *loti* observed by Orbtel descended only to a depth of twenty to twenty-five millimetres, where they selected a suitable cavity amongst the soil particles. This chamber was subsequently reinforced by fastening the surrounding soil particles together with a sparse cobweb-like tissue spun from the anus. The larvae moulted after about four hours to produce the prepupae. This stage is agile and often changes position within the subterranean chamber, although there are periods of immobility often lasting for several hours. The prepupae moulted after about three days to give rise to the pupae. The adults emerged after about three and a half days. It is quite possible that *loti* overwinters in the larval condition, as does *confusus*. Morison has collected adults during the colder months of the year but these may appear as the result of a short period of milder weather. Females emerge slightly before males, and up to three eggs may develop at one time.

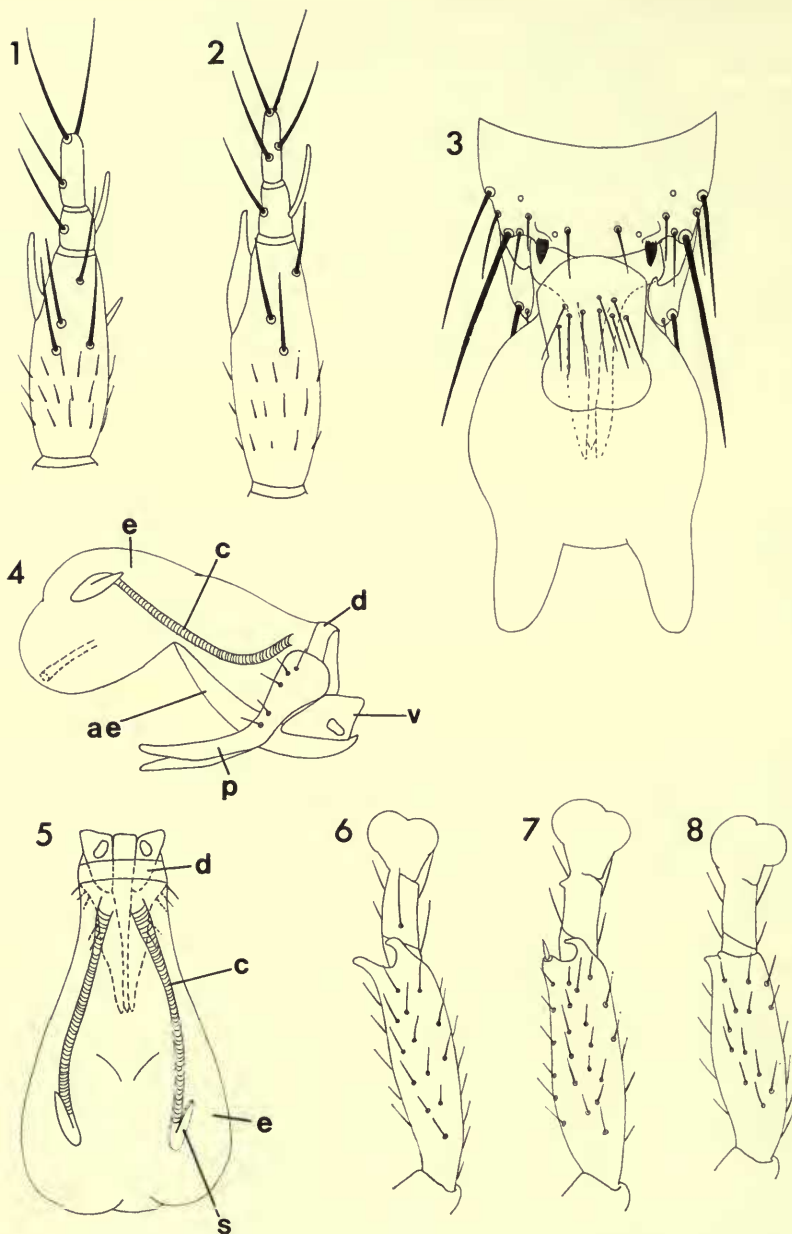
MALE GENITALIA

Several authors have referred to the structure of the external genitalia of Thysanoptera. However their accounts have been confined either to the morphological study of a few species from each major group, i.e., Doeksen (1941), Hartwig (1952), and Priesner (1960), or to the taxonomy of the genus *Haplothrips* of the sub-order Tubulifera, i.e., Priesner (1938), Fabian (1938) and Klimt (1969). This is the first attempt to use the structure of the male genitalia in the taxonomy of the Terebrantia.

The terminology of the parts of the male genitalia is confused. This is largely due to earlier workers, i.e., De Gryse & Treherne (1924), who were apparently unaware that in the Terebrantia as well as in the Tubulifera the male genitalia consist for the greater part of a large extrusible membranous vesicle. The terminology suggested by Heming (1970), in his account of the postembryological development of *Haplothrips verbasci* and *Frankliniella fusca*, has been adopted throughout this paper.

The major component of the male intromittent organ is, as stated above, a large extrusible membranous vesicle which is called the endotheca (Text-figs 4 & 5). During copulation this lies dorsal to the paired parameres and median 'primitive aedeagus', all three of which are solid chitinous processes. These processes, which taper distally, are attached at their bases to the two ventral plates of the phallobase. The dorsal plate of the phallobase is narrow and is attached to the antero-lateral margins of the ventral plates. The ventral plates have a large foramen near the anterior end. The parameres bear numerous hair-like structures corresponding to the 'sensilla trichodea' of Heming (1970).

The endotheca of *phaleratus* and *pictipennis* is bilobed and does not bear any spines. All other species of *Odontothrips* examined bear one or more pairs of spines on the endotheca, which is not as markedly bilobed as in *phaleratus* or *pictipennis*. The arrangement of the endothecal spines is variable and in some species the spines are supported by canaliculate structures. These structures, which are here called canaliculi, arise dorsally as an extension of the theca. The pair of caniculi are



FIGS 1-8. 1 & 2. Antennal segments VI to VIII: 1, *pictipennis*. 2, *intermedius*. 3. *pictipennis*, male genitalia and terminal abdominal segments. 4 & 5. *biuncus*, male genitalia: 4, lateral, 5, dorsal. ae - 'primitive aedeagus', c - canaliculi, d - dorsal plate, e - endotheca, p - parameres, s - endotheal spines, v - ventral plates. 6-8. Fore tibia and tarsus: 6, *ulicis*. 7, *loti*. 8, *confusus*.

supported throughout their length by small transverse hoop-like chitinous thickenings which give them the appearance of tracheae. These transverse thickenings are not actually hoop-shaped but are incomplete rings. It is probably one of these canaliculi to which Priesner (1970) refers as the 'taenidia like' ejaculatory duct. Actually the ejaculatory duct is normally only visible within the endotheca, where it opens to the exterior through the gonopore. The aedeagus proper is reduced to an incomplete ring of chitin supporting the gonopore. A similar reduction of the aedeagus is found in *Chirothrips manicatus* Haliday, which also bears large endothecal spines, see Pitkin (1972, in press).

Most of the *Odontothrips* species which have been studied differ from each other in the number and distribution of endothecal spines and the chaetotaxy of the ninth tergite. With experience these structures are often visible in poorly mounted specimens, but care should be taken, when fresh material is collected and mounted, to prepare males with these characters displayed as fully as possible. Specimens should be collected either into A.G.A. (a mixture of glacial acetic acid - 1 part; glycerine - 1 part; 60% alcohol - 10 parts) or into a low concentration alcohol (50-60%) as these fluids cause most specimens to become distended and remain relaxed and soft. The A.G.A. mixture must be removed by washing for several hours in 60% alcohol. Dehydration is best carried out through a progression of alcohols to absolute alcohol in the minimum effective time, and to facilitate this it is usually necessary to pierce the body with a fine needle in several places. Specimens may be cleared in clove oil prior to mounting in Canada Balsam. Where possible I have used the above techniques, but both Heming (1969) and Hartwig (1952) give detailed alternatives, which are apparently as effective.

ODONTOTHRIPS Amyot & Serville

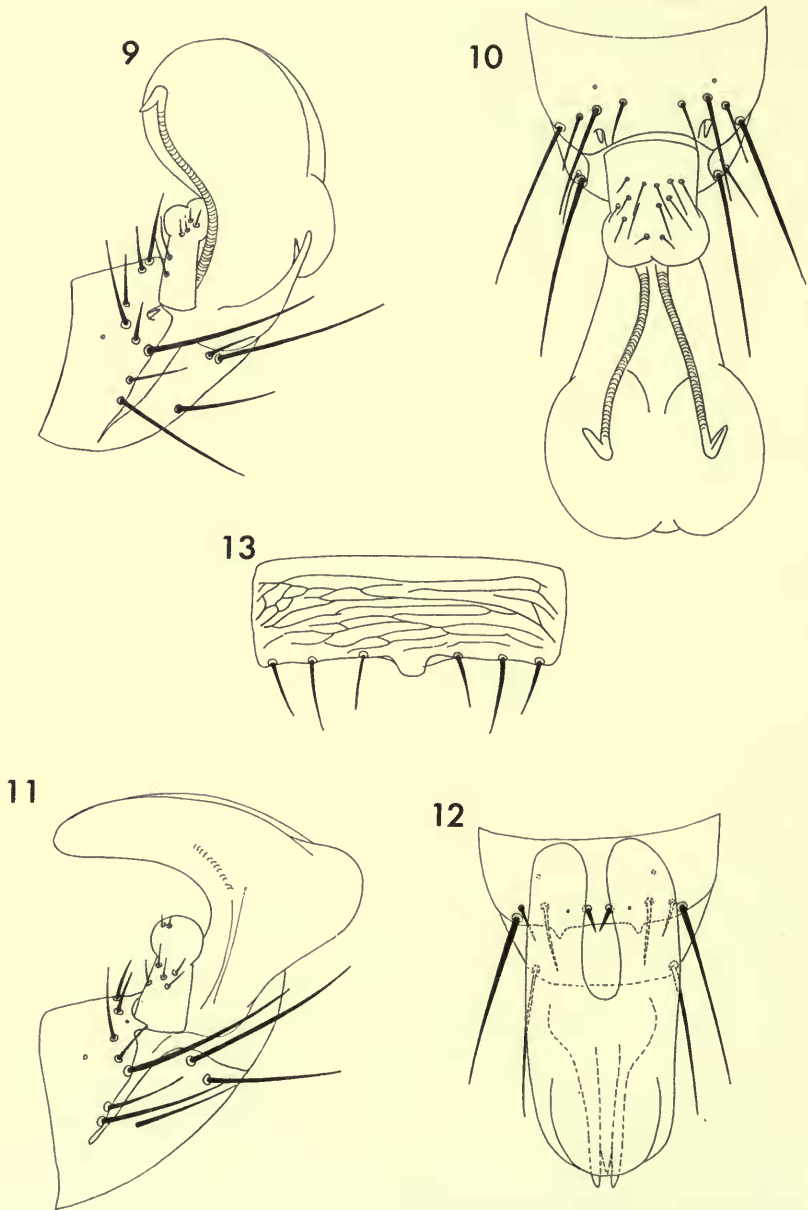
- Odontothrips* Amyot & Serville, 1843 : 642. Type-species, by subsequent designation by Karny (1907 : 45), *Thrips palerata* Haliday.
Odontothrips Amyot & Serville; Priesner, 1951 : 357-9.
Odontothrips Amyot & Serville; Priesner, 1964 : 65-69.

Body-length 1.3 to 2.0 mm, males smaller than females. Colour brown to very dark brown, almost black; antennal segments III and often part of IV yellow; tarsi and fore tibiae yellow. Antennae eight-segmented, the last two segments forming a style; segments III and IV with forked sense cones; the sense cone on VI with the base greatly enlarged in all species except *pictipennis* and *moerens* (Text-figs 1 & 2). Maxillary palps three-segmented, labial palps two-segmented. Three pairs of ocellar setae, pair III longer than one side of the ocellar triangle and arising within the triangle or on its anterior margin.

Pronotum with two pairs of elongate posteroangular setae; metanotum with two pairs of setae very close to or on the anterior margin, the median pair longer than the lateral pair. Always macropterous, fore wings with two veins, setal row on fore vein interrupted sub-apically, usually shaded except for a pale band near the base, a few species also have a pale sub-apical band. Fore tibiae usually with one or two claw-like processes at the apex, but these may be reduced; tarsi two-segmented; the distal segment often with one or two small hooks or tubercles (claws and tubercles are more easily seen in lateral view).

Abdominal tergites I to VII and IX and X resemble the sternites in lacking microtrichia; tergite VIII of female with a posteromarginal comb of microtrichia, which is broadly interrupted medially, and a small number of microtrichia anterolaterally near the spiracle; tergite X of

female with an incomplete longitudinal split. Sternites without accessory setae. Males without sternal glands, with or without a pair of thornlike processes on tergite IX, endotheca of phallus usually bearing spines.



FIGS 9-13. 9-12. Male genitalia and terminal abdominal segments: 9 & 10, *loti*, lateral and dorsal. 11 & 12, *phaleratus*. 13. *phaleratus*, sternite V.

The genus *Odontothrips* is most closely related to the Australian genera *Odontothripiella* Bagnall and *Odontothripoides* Bagnall. Species of these genera however either have a single pair of posteroangular setae on the pronotum or lack them entirely. The males of all three species of *Odontothripiella*, and apparently *Odontothripoides morisoni*, lack endothecal spines.

KEY TO SPECIES

- 1 Base of sense cone on antennal segment VI small, maximum diameter less than one-third of total length of the sense cone (Text-fig. 1) 2
- Base of sense cone on antennal segment VI greatly enlarged, maximum diameter more than one-third of total length of the sense cone (Text-fig. 2) 3
- 2 Fore tibiae with one stout claw at the apex. Fore wings without a pale sub-apical band, upper vein with about 4 + 11 + 2 setae, lower vein with 14 to 18 setae. Male unknown. From West Africa *moerens* Priesner (p. 393)
- Fore tibia with two stout claws at apex. Fore wings with a pale sub-apical band, upper vein with about 4 + 8 to 11 + 2 setae, lower vein with 11 to 16 setae. Male genitalia bilobed and without endothecal spines (Text-fig. 3). From North America *pictipennis* Hood (p. 396)
- 3 Distal fore tarsal segment with one or two small hooks or tubercles on inner margin (Text-fig. 7) 4
- Distal fore tarsal segment without small hooks or tubercles (Text-figs 6 & 8) 11¹
- 4 Fore tibia with one or two stout claws at apex (Text-fig. 7) 5²
- Fore tibia without stout claws, but with two small claws or one small claw and a bristle-bearing tubercle (Text-fig. 8) 6
- 5 Fore tibia with one stout claw (Text-fig. 7). ♀ abdominal tergites II to VIII weakly striate lateral to the median setae only. Male genitalia with a single pair of stout endothecal spines supported by a well developed canaliculus (Text-figs 9 & 10) .
On *Lotus*, *Anthyllis*, *Ononis* or *Trifolium* throughout Europe and introduced into North America *loti* (Haliday) (p. 391)
- Fore tibia with two stout claws. ♀ abdominal tergites II to VIII with sculpture between the median setae as well as laterally. Male genitalia (Text-fig. 19) similar to *loti*.
On *Vicia*, throughout Europe *biuncus* John (p. 383)
- 6 Fore tibia with two small claws *paraconfusus* Pelikan³ (p. 395)
- Fore tibia with one small claw and a bristle-bearing tubercle 7⁴
- 7 Male genitalia with one pair of stout endothecal spines, which are supported by canaliculi (Text-fig. 21)
On various Papilionaceae in the Mediterranean region, common in North Africa *karnyi* Priesner (p. 390)
- Male genitalia with more than one pair of endothecal spines 8
- 8 Male genitalia with needle-like endothecal spines (Text-figs 22 & 23).
On various Papilionaceae flowers in the Canary Islands and Morocco *retamae* Priesner (p. 397)
- Male genitalia with stout endothecal spines 9
- 9 Median pair of spines on abdominal tergite IX of male very stout (Text-fig. 18).
Male genitalia with two to three pairs of endothecal spines, the distal pair set apart from the basal one or two pairs.
On *Spartium*, from Albania, Turkey and Cyprus *meridionalis* Priesner (p. 393)

¹ see text-notes for *phaseoli* (p. 396)

² see text-notes for *konumensis* (p. 391)

³ ex description

⁴ see text-notes for *ononidis* (p. 395), *vuilletia* (p. 400) and *karnyi* subsp. *rivnayi* (p. 391).

- Median pair of spines on tergite IX of male setiform 10
- 10 Median area of pronotum of males and females without lines of sculpture. Male genitalia with three to four pairs of endothecal spines, the distal two or three pairs set apart from the basal pair, which are usually larger (Text-figs 16 & 17).
On *Melilotus*, from southern England, France, Germany, Hungary and Czechoslovakia **meliloti** Priesner (p. 392)
- Median area of pronotum with lines of sculpture. Male genitalia with four to five pairs of endothecal spines, rarely more, decreasing in size distally and spaced fairly regularly (Text-figs 14 & 15).
On *Ulex minor* or *U. gallii*, in Western Europe **ignobilis** Priesner (p. 387)
- 11 Fore tibia with one or two stout claws at the apex 12
- Fore tibia without stout claws, but with small teeth or a small tooth and a bristle-bearing tubercle (Text-fig. 8) 16
- 12 Fore tibia with two stout claws 13
- Fore tibia with one stout claw 14
- 13 Hind margin of abdominal tergite IX of male with a pair of strong dark processes laterally (Text-fig. 26). Male genitalia with three or four pairs of endothecal spines, the basal pair not much larger than the two or three distal pairs (Text-figs 26 & 27). Fore wing with 14 to 18 setae on the lower vein.
On *Cytisus*, from Scotland and Norfolk **cytisi** Morison (p. 385)
- Hind margin of abdominal tergite IX of male without processes laterally. Male genitalia with three pairs of endothecal spines, the basal pair larger than the distal two pairs (Text-figs 24 & 25). Fore wing with 17 to 23 setae on the lower vein.
On *Ulex europaeus*, in the British Isles and France **ulicis** (Haliday) (p. 399)
- 14 Fore tarsus with a curved terminal claw **viciae** Priesner (p. 400)
- Fore tarsus without terminal claw 15
- 15 Sternites IV to VII of male each with a median posterior lobe (Text-fig. 13). Male genitalia with a bilobed endotheca which lacks endothecal spines (Text-figs 11 & 12).
On *Lathyrus*, *Vicia*, throughout Europe **phaleratus** (Haliday) (p. 395)
- Sternites of male without median lobes. Structure of male genitalia not known.
On *Lathyrus niger* and *Lathyrus tuberosum* from North and Central Europe, Rumania and the U.S.S.R. **intermedius** (Uzel) (p. 389)
- 16 Fore wings distinctly shaded 17
- Fore wings pale except at the extreme apex 20
- 17 Apex of fore tibia with two small teeth 18
- Apex of fore tibia with one small tooth.
Upper vein of fore wing with 4 + 14 + 2 setae, lower vein with 15 to 16 setae.
On *Tilia cordata*, from Hungary, Czechoslovakia and the U.S.S.R. **edentulus** Priesner (p. 387)
- 18 Hind tibia 130 to 155 μ , smallest species of *Odontothrips*.
Antennal segment II dark, III pale. On *Dorycnium*, in France **dorycnii** Priesner (p. 387)
- Hind tibia more than 160 μ , larger species 19
- 19 Antennal segment II dark, III pale. Male with two pairs of fairly stout endothecal spines on the genitalia, which are supported by canaliculi (Text-fig. 20).
On *Medicago* spp. and *Eryngium*, from Germany, Hungary, Czechoslovakia, Jugoslavia and the U.S.S.R. **confusus** Priesner (p. 384)
- Antennal segments II and III pale, IV darker than III but paler than V. Male genitalia not known.
On *Vicia cracca*, similar distribution to *confusus* **aemulans** Priesner (p. 383)

- 20 Pronotum and abdominal tergites II to VIII with lines of sculpture medially
elbaensis Priesner (p. 387)
 - Pronotum and abdominal tergites II to VIII without lines of sculpture medially
phlomidinus Priesner (p. 396)

DESCRIPTIONS OF SPECIES

Odontothrips aemulans Priesner

(Map 5)

Odontothrips aemulans Priesner, 1924 : 1. ? Syntype ♀♀, RUMANIA: Visau, Iasi, on meadow grass, May (*W. Knetchel*) (Priesner coll.). [not examined].

This species is related to *dorycnii* and *confusus* but can be distinguished by the colour of antennal segments II to IV. The lower vein of the fore wing bears a row of 14 to 15 setae. *O. aemulans* is recorded by Priesner (1964) from Czechoslovakia, Germany, Hungary, Rumania and Yugoslavia, and by Dyadechko (1964) from the U.S.S.R. The host-plant is apparently *Vicia cracca*.

MATERIAL EXAMINED. CZECHOSLOVAKIA: Pourdrany, 3 ♀, 1938; HUNGARY: Simontornya, on *Vicia cracca*, 2 ♂, 5 ♀, [incorrectly labelled as 'Cotypes'], 25.iv.1926 (*F. Pillich*) (Priesner coll. and BMNH).

Odontothrips biuncus John

(Text-figs 4, 5, & 19; Map 1)

Odontothrips biuncus John, 1921 : 7-8. 2 ♂, 54 ♀, syntypes, U.S.S.R.: Leningrad, on *Vicia cracca* (2 ♀ in BMNH, depository of remainder unknown) [2 ♀ examined].

[*Odontothrips uzeli* Bagnall; Bagnall, 1924 : 272. Misidentification.]

Odontothrips biuncus John; Mound, 1968 : 45.

Bagnall (1924) misidentified specimens of *biuncus* from Durham and he labelled these incorrectly as 'types' of *uzeli*, although they were collected several years after *uzeli* was described. Bagnall's specimens, with two stout tibial claws, have been compared with females of the type-series of *biuncus*.

The male genitalia of *biuncus* (Text-fig. 19) are similar to *loti* and *karnyi*, but the species may be distinguished by the presence of two stout tibial claws. Priesner records *biuncus* throughout Western Europe. This species apparently breeds on *Vicia cracca*, although both males and females may be numerous on *V. sepium* and *Lathyrus pratensis*.

MATERIAL EXAMINED. 2 ♀ syntypes, U.S.S.R.: Leningrad (Tzarskoje Selo), on *Vicia cracca*, 26.vi.1921 (*O. John*).

ENGLAND: Durham, Gibside, on *V. cracca*, 2 ♂, 4 ♀, vii.1924; Devon, Falmouth, on *V. cracca*, 4 ♂, 11 ♀, 28.vi.1970 (*J. Palmer*); Herts., Sawbridgeworth, 2 ♀, 19.vii.1970 (*B. R. Pitkin*); N. E. SCOTLAND: on *V. cracca*, 8 ♂, 14 ♀, 1950-1964 (*G. D. Morison*); FRANCE: Anse, on *V. cracca* and *Agrimonium eupatorium* (Rosaceae); PORTUGAL: Oporto, on *Genista*, 1 ♀, 4.v.1960 (*E. R. Speyer*).

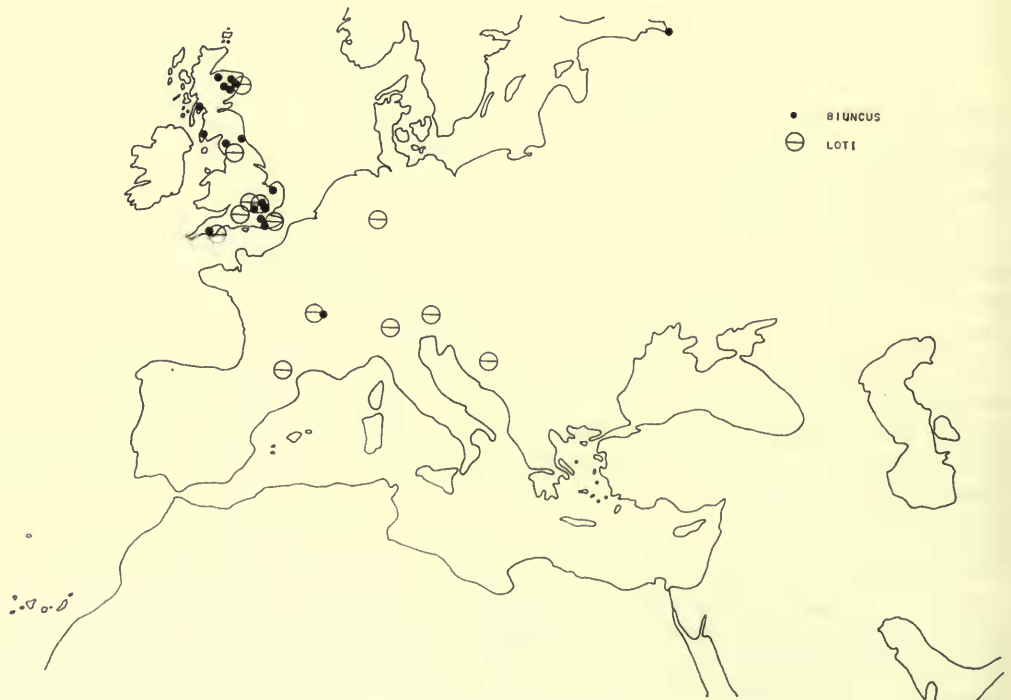
***Odontothrips confusus* Priesner**

(Text-figs 8 & 20; Map 5)

Odontothrips confusus Priesner, 1926 : 237, ?♂♂ and ♀♀ syntypes, HUNGARY: on flowers of *Medicago falcata* (!) and *Trifolium rubens*. June and July (*Pillich*) (Priesner coll.) [not examined].

This species may be distinguished from *dorycnii* only by its larger size. The antennae differ in colouration from *aemulans* as stated earlier. The fore wings bear 14 to 15 setae on the lower vein. The male genitalia of *confusus* (Text-fig. 20) bear two pairs of stout endothecal spines which are supported by canaliculi. Recorded from Southern, Central, and Eastern Europe by Priesner (1964), *O. confusus* is a pest of *Medicago sativa* in France and has also been recorded from *M. media*, *M. falcata* and *Trifolium rubens* (Bournier, 1965).

MATERIAL EXAMINED. HUNGARY: Simontornya, 'Trockener Waldiseg Rasen', 1 ♂, 1 ♀, 'Cotypes' [?sic], 21.vii.1924 (*F. Pillich*) (Priesner coll.); Simontornya, on *Eryngium campestre*, 2 ♀, 'Cotypes' [?sic], 31.vii.1927 (1 ♀ in Priesner coll. and 1 ♀ in BMNH); FRANCE: Rhone, Liergues, on *Medicago sativa* and *Trifolium repens*, 5 ♀, 5.vii.1927 (*O. John*); GERMANY: Eisleben, on *Medicago falcata*, 2 ♀, 13.vi.1950 (*H. von Oettingen*); Frankfurt/Main Bergen, on *Medicago sativa*, 2 ♂, 29.vii.1962 (*R. zur Strassen*) (SMF); Hessen Florsheim/Main, on *Coronilla vulgaris*, 4 ♂, 10.vii.1962



MAP 1. Distribution of *Odontothrips biuncus* and *loti*.

(*R. zur Strassen*) (SMF); SWITZERLAND: Tessin, Lago Maggiore, Ascone, on *Lotus corniculatus*, 2 ♂, 20.vii.1963 (*R. zur Strassen*) (SMF); CZECHOSLOVAKIA: Brno, on Lucerne, 2 ♂, 3 ♀, 24.vii.1961; Pourdrany, and Koogli, 2 ♂, 1 ♀, 1938; Pourdrany, 1 ♂, 1 ♀, 3.vii.1955 (*J. Pelikan*) (USNM); YUGOSLAVIA: Golija-kaskovo, on *Artemisia absinthium*, 3.viii.1964 (*G. D. Morison* leg.); Sabac, on *Trifolium pratensis*, 1 ♂, 10.vi.1960 (*G. D. Morison* leg.); Zemun, 1 ♂, 3 ♀, 5.vii.1962 and 21.vi.1962 (*G. D. Morison* leg.); TURKEY: Bursa, on *Medicago*, 3 ♂, 25.vi.1949 (*Tomer*) (Priesner coll.).

***Odontothrips cytisi* Morison**

(Text-figs 26 & 27; Map 3)

Odontothrips cytisi Morison, 1928 : 38. Holotype ♀, SCOTLAND: Aberdeenshire and Kincardineshire, on *Cytisus scoparius* (BMNH) [examined].

This species is related to *ulicis*. Females of *cytisi* and *ulicis* cannot be readily distinguished. The lower vein of the fore wing has 14 to 18 setae. Males may be distinguished by the presence of a pair of stout processes on the ninth abdominal tergite and the smaller pair of spines at the base of the endotheca of the genitalia (Text-figs 26 & 27). Morison (1948) records this species from eleven counties in Scotland and from Norfolk, breeding in the flowers of *Cytisus scoparius*.

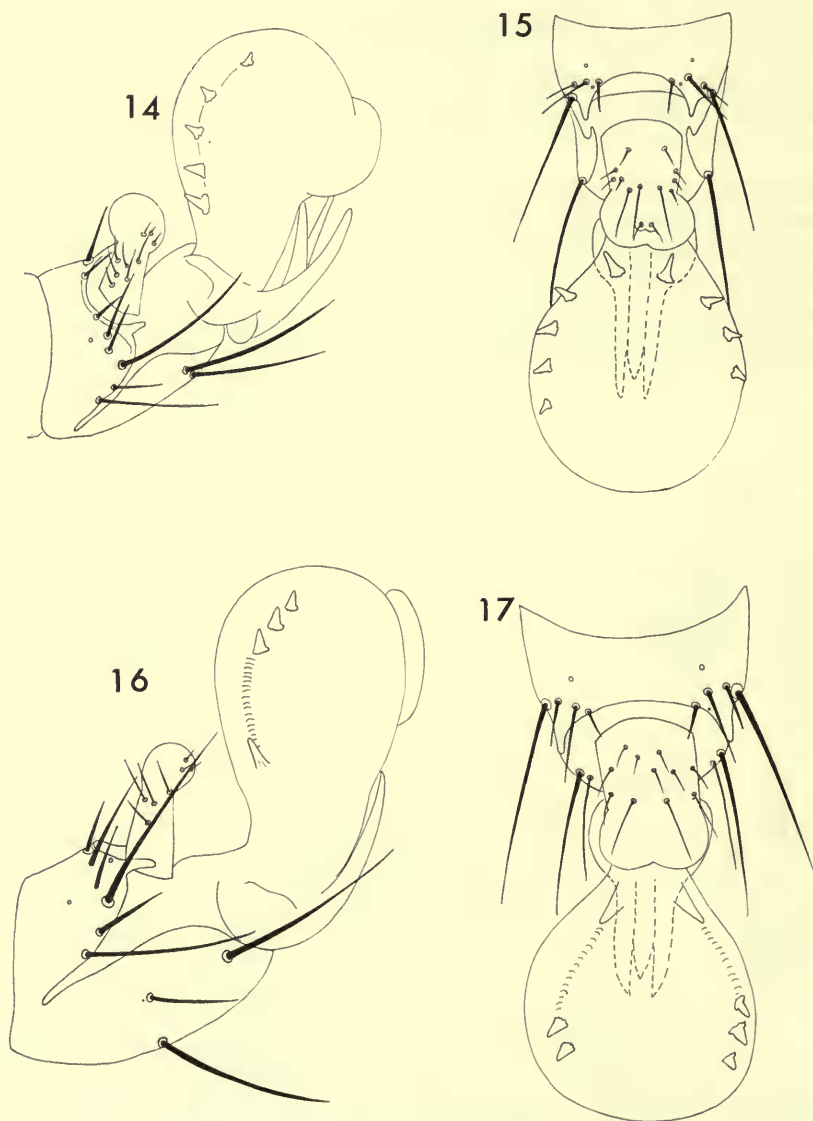


MAP 2. Distribution of the *ignobilis* group.⁵

⁵ Specimens of *karnyi* from S. Portugal have been examined since this map was prepared.

MATERIAL EXAMINED. Holotype ♀, paratypes, 5 ♂, 8 ♀, SCOTLAND: Aberdeenshire and Kincardineshire, on *Cytisus*, 1924-1927 (G. D. Morison).

SCOTLAND: Kincardineshire, Blaire, on *Vaccinium myrtillus*, 4 ♂, 4 ♀, 2.v.1927 (G. D. Morison); Aberdeen., Dyce, on *Cytisus*, 7 ♀, 3.iv.1964 (L. A. Mound); Aberdeen., Deskry, on *Cytisus*, 3 ♀, 25.v.1966 (L. A. Mound & B. R. Pitkin); Aberdeen., Bucksburn, on *Cytisus*, 9 ♀, 24.v.1966 (L. A. Mound & B. R. Pitkin); Aberdeen., on



FIGS 14-17. Male genitalia and terminal abdominal segments: 14 & 15, *ignobilis*, lateral and dorsal. 16 & 17, *meliloti*, lateral and dorsal.

Cytisus, I ♂, II ♀, 23.v.1966 (L. A. Mound & B. R. Pitkin); N. E. SCOTLAND: on *Cytisus scoparius*, 66 ♂, 69 ♀, 1950-1964 (G. D. Morison).

***Odontothrips dorycnii* Priesner**

(Map 5)

Odontothrips dorycnii Priesner, 1951 : 355. 4 ♀ syntypes, FRANCE: Camargues, Bouches du Rhone, on *Dorycnium jordanii* (Priesner coll.) [2 ♀ examined].

This species, described from females only, may be distinguished from *confusus* by its smaller size.

MATERIAL EXAMINED. 2 ♀ syntypes, FRANCE: Camargues, Bouches du Rhone, on *Dorycnium jordanii* (R. de Mallman) (Priesner coll.).

***Odontothrips edentulus* Priesner**

(Map 5)

Odontothrips edentulus Priesner, 1926 : 238. Holotype ♀, HUNGARY: Simontornya, on *Tilia cordata* (Priesner coll.) [examined].

The fore wings of the unique female holotype bear 4 + 14 + 2 setae on the upper vein, and 15 to 16 setae on the lower vein. This species bears one small tooth at the apex of the fore tibia.

MATERIAL EXAMINED. Holotype ♀, HUNGARY: Simontornya, on *Tilia cordata* (Tiliaceae), 22.vi.1925 (F. Pillich) (Priesner coll.).

***Odontothrips elbaensis* Priesner**

(Map 5)

Odontothrips elbaensis Priesner, 1933 : 6. Holotype ♀, EGYPT: Wadi Rabet, Elba Mountains, swept from weeds at the bottom of Wadi, 2.i.1933 (H. Priesner) (Ministry of Agriculture, Egypt) [not examined].

This species, described from two females collected in the Elba Mountains, has wings hyaline, except at the extreme apex of the fore wing, which is tinged with brown.

MATERIAL EXAMINED. Paratype ♀, EGYPT: Wadi Rabet, Elba Mountains, swept from weeds at the bottom of Wadi, 2.i.1933 (Priesner coll.).

***Odontothrips ignobilis* Bagnall sp. rev.**

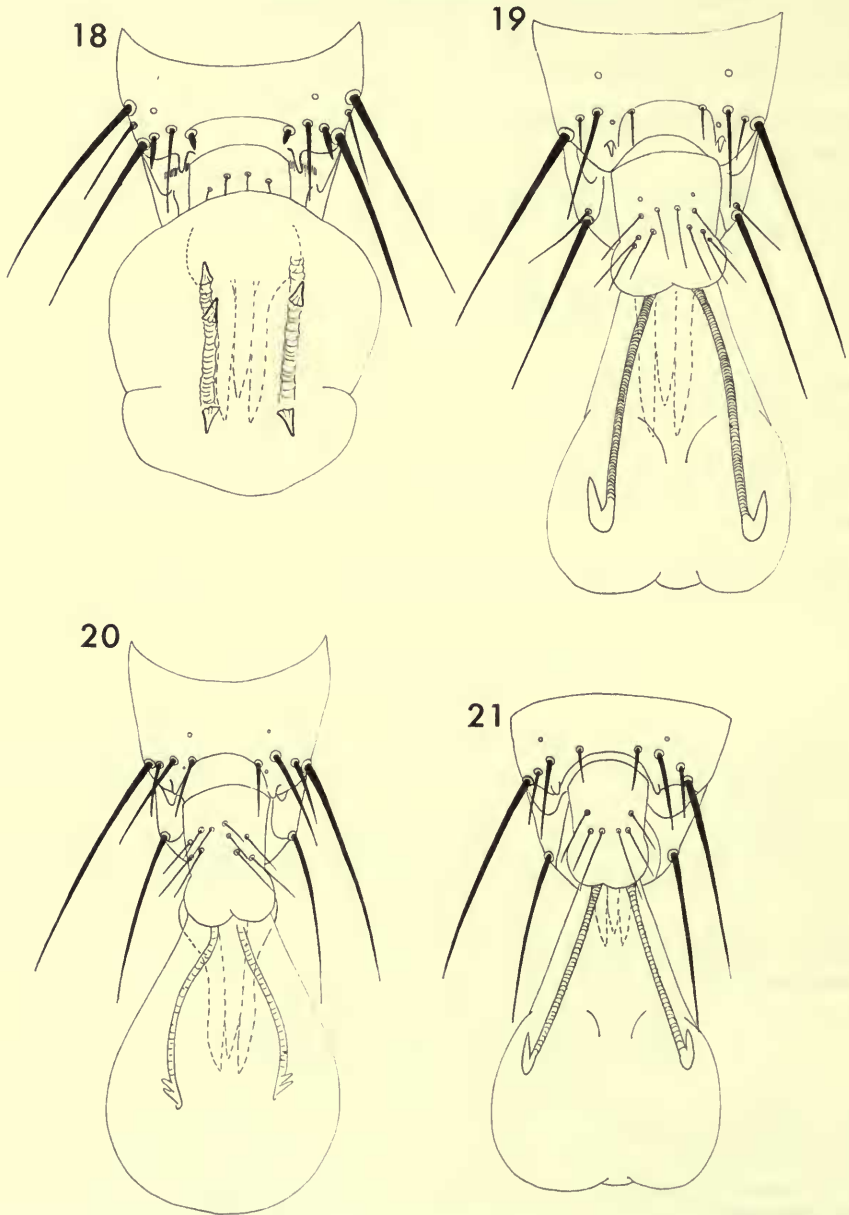
(Text-figs 14 & 15; Map 2)

Odontothrips ignobilis Bagnall, 1919 : 262-263. Holotype ♀, SPAIN: Ortigosa, Logrosa [examined].

Odontothrips mutabilis Bagnall, 1924 : 271-272. 7 ♀ syntypes, ENGLAND: Hants, Bournemouth, on *Ulex* [examined].

Odontothrips inermis Bagnall, 1928 : 95-96. Holotype ♂, ENGLAND: Cheshire, Delamere [examined].

O. ignobilis, which Mound (1968) synonymized with *meridionalis*, may be distinguished from *meliloti* and *meridionalis* by the presence of lines of sculpture on the median area of the pronotum. The male genitalia of *ignobilis* (Text-figs 14 & 15) bear four or five pairs of endotheal spines which decrease in size distally and are



FIGS 18-21. Male genitalia and terminal abdominal segments: 18, *meridionalis*, 19, *biuncus*, 20, *confusus*, 21, *karnyi*.

arranged at fairly regular intervals. The partially extruded genitalia of the holotype male of *inermis* are identical with genitalia of *ignobilis* and like the females of the type-series of *mutabilis*, this specimen has lines of sculpture on the median area of the pronotum.

O. ignobilis breeds on *Ulex gallii* and *U. minor* and is here recorded from England, the Channel Islands, France, Spain and Portugal.

MATERIAL EXAMINED. Holotype ♀ of *ignobilis*, SPAIN: Ortigosa, Logrosa, 1892, (Coll. Navás). Syntypes, 7 ♀, of *mutabilis*, ENGLAND: Hants, Bournemouth, on *Ulex*, ix.1924 (R. S. Bagnall). Holotype ♂ of *inermis*, ENGLAND: Cheshire, Delamere, 25.viii.1925 (H. Britten).

ENGLAND: Surrey, Ham, on *Melilotus*, 4 ♀, 28.v.1966 (L. A. Mound); Surrey, Ham, on *Sarothamnus*, 1 ♀, 28.v.1966 (L. A. Mound); Surrey, Ham, on *Sarothamnus*, 2 ♂, 3 ♀, 28.vi.1970 (B. R. Pitkin & M. S. Steel); London, Buckingham Palace Grounds, 1 ♂, 25.iv.1961 (V. F. Eastop); ENGLAND: on *Ulex gallii* and *U. minor*, 6 ♂, 92 ♀, (G. D. Morison); CHANNEL ISLANDS; Jersey, St. Brelade's Bay, on *Ulex*, 4 ♀, (B. R. Pitkin); FRANCE: Gers, Ornezon, on *Ulex nanus*, 3 ♂, 7 ♀, 4.viii.1913; Pyrenees, Col de Puymérons, 5,500 ft, on *Genista*, 1 ♀, viii.1926 (R. S. Bagnall); SPAIN: Pyrenees, Urtg, nr Puigicerda, in flowers of 'Stachelginster', 37 ♀, 28.v.1930 (F. Diehl) (Priesner coll.); PORTUGAL: Oporto, on *Ulex gallii*, *U. australis*, *Genista* and *Sarothamnus*, 12 ♂, 11 ♀, v.1960 (E. R. Speyer); Algarve, in yellow flowers of Legume, 8 ♀, 12.vi.1963 (E. R. Speyer); Lousa Beira, Litoral, on *Ulex*, 12.vii.1966 (N. H. L. Krauss); Maiorca, on *Ulex jassiaci* flowers, 2 ♂, 2 ♀, 15.iv.1958 (C. J. Davis) (USNM); Boa Nova, on *Ulex europaeus* flowers, 3 ♂, 3 ♀, 14 & 18. vii.1960 (N. H. L. Krauss) (USNM); nr Santo Antonio de Oliveis, Dianteiro, on *Ulex micranthus*, terminal shoots and leaves, 1 ♂, 1 ♀, (Davis & Silva) (USNM).

Odontothrips intermedius (Uzel)

(Text-fig. 2; Map 4)

Physopus intermedia Uzel, 1895 : 114-115. Syntypes of both sexes, CZECHOSLOVAKIA: (Bohemia), in flowers, June (Uzel coll.) [not examined].

Odontothrips intermedius (Uzel) Karny, 1912 : 329.

The fore wings of *intermedius* bear 4 + 9 + 2 setae on the upper vein, and 14 to 17 setae on the lower vein. In addition to the pale band near the base, the fore wings have a pale sub-apical band which in some specimens is almost hyaline. Bagnall recorded a single female from the British Isles, but this specimen has apparently been lost (Mound, 1968). The structure of the male genitalia is unknown.

Priesner (1964) records *intermedius* from North and Central Europe and Rumania, and Dyadechko (1964) recorded it from the U.S.S.R. The host plants are apparently *Lathyrus tuberosus* and *L. niger*.

MATERIAL EXAMINED. AUSTRIA: Linz, on *Lathyrus niger*, 1 ♂, 2 ♀, 17.iv.1926 and on *L. niger*, 3 ♀, 13.v.1926 (ex Priesner coll.) (USMN); HUNGARY: Simontornya, on *L. niger*, 2 ♀, 14.v.1926 (F. Pillich); CZECHOSLOVAKIA: Pourdrany, 1 ♀.

Odontothrips karnyi Priesner

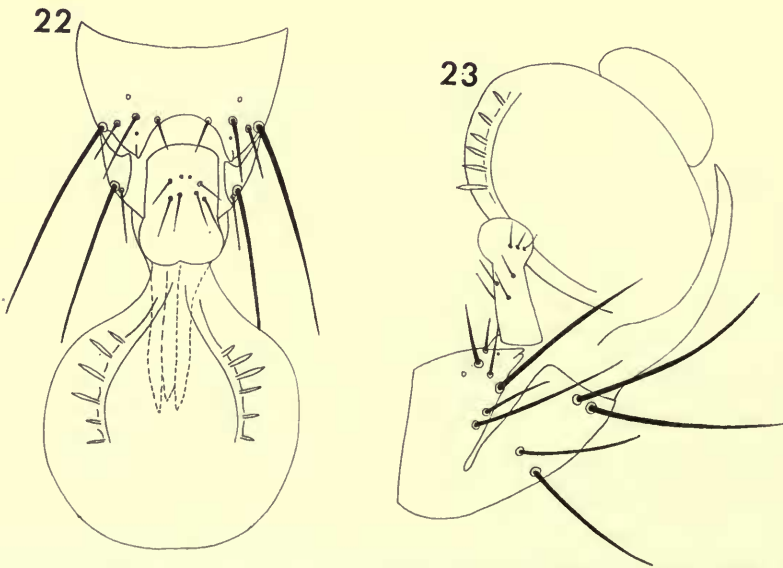
(Text-fig. 21; Map 2)

Odontothrips karnyi Priesner, 1924 : 1. Syntypes of both sexes, EGYPT: ('Anglo-aegyptian Sudan' according to Priesner) Assuan, Shellal, on *Lupinus* sp. (Priesner coll.) [2 ♂, 3 ♀, syntypes examined].

Priesner described two varieties of *karnyi*, namely var. *rivnayi* from Israel and var. *retamae* from the Canary Islands. The latter variety Priesner (1933) referred to as 'var. *retamae* Enderlein (*in schedis*)' since the specimens on which the variety was described had been originally misidentified by Enderlein as *karnyi*. R. zur Strassen (1969) indicated that he could see no obvious differences between specimens collected in the Canary Islands and *karnyi* from Egypt. Examination of material from both localities including syntypes of *karnyi* has led to a different interpretation. Although females from the Canary Islands are at present indistinguishable from *karnyi*, the males of the two species have distinct genitalia. The male genitalia of *karnyi* sensu stricto (Text-fig. 21) bear a single pair of stout endothecal spines which are supported by poorly developed canaliculi. All the males examined from the Canary Islands have numerous needle-like endothecal spines. *O. retamae* is therefore here regarded as a distinct species.

O. karnyi is recorded here from Israel, Egypt, Tunisia, Algeria and Morocco, and apparently feeds in the flowers of various Papilionaceae.

MATERIAL EXAMINED. Syntypes, 2 ♂, 3 ♀, EGYPT: Assuan, Shellal, on *Lupinus* sp., 7.ii.1914 (Prof. R. Ebner) (Priesner coll.).



FIGS 22-23. *O. retamae*, male genitalia and terminal abdominal segments, dorsal and lateral.

EGYPT: Luxor, on *Sesbania*, 1 ♀, 5.ii.1914 (*Prof. R. Ebner*); Montazah, on sweet peas, 2 ♂, iii.1939 (*H. Priesner*) (*Priesner coll.*); Sinai, W. Gederat, on *Nitraria retusa* (*Zygophyllaceae*), 1 ♂, 7.iv.1937 (*H. Priesner*) (*Priesner coll.*); Egypt, 2 ♀ (ex coll. C. B. Williams) (USNM); ISRAEL: Rehovath, on Alfalfa, 1 ♂, 1 ♀, 22.iii.1945 (*Rivnay*); TUNISIA: Tunis, on *Medicago*, 1 ♀ (ex coll. C. B. Williams) (USNM); ALGERIA: on *Melilotus* and Leguminosae, 3 ♀ (ex coll. C. B. Williams) (USNM); MOROCCO: Cap Blanc, nr Mazagan, on flowering *Retama monosperma webbii*, 15 ♂, 8 ♀, 11.ii.1965 (*R. zur Strassen*); Rabat, on *Ulex*, 3 ♂, 20.iv.1960 (*Kramer & Drea*) (USNM); PORTUGAL: Monte Gordo, 6 ♂, 6 ♀, 17.v.1971 (*D. J. Williams*).

***Odontothrips karnyi rivnayi* Priesner**

(Map 2)

Odontothrips karnyi var. *rivnayi* Priesner, 1933 : 8. Numerous syntypes of both sexes, ISRAEL: Various localities, dates and hosts (*Rivnay*) (*Priesner coll.*) [not examined].

This variety is apparently smaller than *karnyi* sensu stricto and according to Priesner (1964) may be distinguished by having fewer wing setae on the lower vein of the fore wing and some specimens lack tarsal teeth. Three females and one male from Israel have been recently examined. The fore wings bear 4 + 14 to 17 + 2 setae on the upper vein, all specimens lack tarsal teeth. The male genitalia are identical with *karnyi* sensu stricto. The published data are ISRAEL: Palestine, Mikveh, on flowers of *Cajanus indicus*, ♀ and ♀, xi.1931; further specimens from Zichron, Jakov, on *Citrus medica*, 29.xii.1931; Tel Aviv, on composites, 26.xii.1931; Ramath Gan, on *Pisum sativum*, 21.xii.1931; Tel Aviv, on *Acacia* flowers, 8.i.1932 (all in Priesner coll.).

MATERIAL EXAMINED. ISRAEL: Tel Aviv University Botanical Gdns., on *Retama*, 3 ♀, 1 ♂, 26.iv.1971 (*D. Gerling*).

***Odontothrips konumensis* (Ishida) comb. n.**

Taeniothrips konumensis Ishida, 1931 : 37-39. Holotype ♀, JAPAN: Saghalien, on flowers of the meadow grasses and clover, 2.vii.1930 (*C. Watanabe*) (Entomological Institute, Faculty of Agriculture, Hokkaido University, Japan) [not examined].

The unique female of *konumensis* was not available to the author but the description suggests that this species may well represent *biuncus* John.

***Odontothrips loti* (Haliday)**

(Text-figs 9 & 10; Map 1)

Thrips loti Haliday, 1852 : 1108. Syntypes of ? both sexes, ? GREAT BRITAIN: on *Lotus corniculatus* [lost].

[*Odontothrips ulicis* (Haliday); Uzel, 1895 : 115. Misidentification.]

Euthrips ulicis californicus Moulton, 1907 : 56. Syntypes 4 ♂, 3 ♀, U.S.A.: California, Wrights Station, Santa Clara County, vetch sweepings (*D. Moulton*) (California Academy of Sciences, San Francisco) [not examined].

Odontothrips loti (Haliday); Williams, 1916 : 277.

Odontothrips uzeli Bagnall, 1919 : 262. Lectotype ♀, CZECHOSLOVAKIA: Bohemia (BMNH), here designated [examined]. [Synonymized by Mound, 1968 : 45.].

- Odontothrips anthyllidis* Bagnall, 1928 : 96-97. Holotype ♀, SCOTLAND: Aberdeen, on *Anthyllis* (BMNH) [examined]. [Synonymized by Priesner, 1964 : 66.]
- Odontothrips thoracicus* Bagnall, 1934a : 59-60. Holotype ♀, ENGLAND: W. Grimstead, nr Salisbury, on *Ononis* (BMNH) [examined]. [Synonymized by Priesner, 1964 : 66.]
- Odontothrips quadrimanus* Bagnall, 1934a : 60. Holotype ♀, ENGLAND: Kent, Tankerton, on *Ononis spinosa* (BMNH) [examined]. [Synonymized by Priesner, 1964 : 66.]
- Ondontothrips brevis* Bagnall, 1934b : 488. [Lapsus calami for *brevipes*.]
- Odontothrips brevipipes* Bagnall, 1934b : 488. Holotype ♀, SWITZERLAND: Lugano (BMNH) [examined]. [Synonymized by Mound, 1968 : 45.]

Bagnall (1919) proposed the name *uzeli* for specimens misidentified by Uzel (1895) as *ulicis*. The male genitalia of *uzeli*, *anthyllidis*, *quadrimanus* and *brevipes* have been compared with *loti* (Text-figs 9 & 10). The endotheca bears a single pair of stout endothecal spines supported by canaliculi. The type-material of these four species and the unique female *thoracicus* have only one stout claw at the apex of the fore tibia as in *loti*, and not two as in *biuncus*. *O. loti* lacks lines of sculpture medially on abdominal tergites II to VIII.

Recorded by Priesner (1964) throughout Europe, *loti* apparently feeds in the flowers of *Lotus*, *Anthyllis*, *Ononis*, and *Trifolium*.

MATERIAL EXAMINED. Lectotype ♀, paralectotypes 2 ♂, 1 ♀, of *uzeli*, CZECHOSLOVAKIA: (Bohemia) (ex coll. Uzel). Holotype ♀, paratypes 1 ♂, 1 ♀, of *anthyllidis*, SCOTLAND: Aberdeen, on *Anthyllis*, viii.1925 (R. S. Bagnall). Holotype ♀, paratypes 2 ♂, 3 ♀, of *quadrimanus*, ENGLAND: Kent, Tankerton, on *Ononis spinosa*, v.1931 (R. S. Bagnall). Holotype ♀, paratype ♂ of *brevipes*, SWITZERLAND: Lugano, vii.1929 (J. J. Mann). Holotype ♀ of *thoracicus*, ENGLAND: W. Grimstead, nr Salisbury, on *Ononis*, vii.1929 (R. S. Bagnall).

ENGLAND: from Sussex, Kent, London, Middlesex, Berkshire, Devon, Dorset, Yorkshire and Westmorland, on *Lotus*, *Anthyllis*, *Ononis* and *Trifolium*, vi-viii, 13 ♂, 16 ♀; SCOTLAND: Kincardineshire, Aberdeenshire, Inverness-shire and Morayshire, on *Lotus*, *Anthyllis*, *Ononis* and *Trifolium*, v-vii, 33 ♂, 60 ♀; AUSTRIA: Carinthia, Ossiach, on *Trifolium*, 1 ♀, 4.viii.1926 (V. F. Eastop); FRANCE: E. Pyrenees, l' Hospitalet, on *Lotus*, 1 ♀, viii.1926 (R. S. Bagnall); from Bois de Laye, Beauregard, Rhone, and other localities, on *Lotus*, *Ononis*, *Anthyllis*, and other plants, 10 ♂, 59 ♀, iv-ix.1927 (*O. John*); GERMANY: Harz, 2 ♀, vii-viii (*H. von Oettingen*); YUGOSLAVIA: Zagreb, Sabac, Maribor, Valjevo, Dugo Selo, Ljubljanic, Kragujevac, Svetozareva, and Vrsac, 3 ♂, 31 ♀, v-ix (*G. D. Morison* leg.); CZECHOSLOVAKIA: Slovakia, grasses, clover and *Vicia cracca*, 11 ♀, 30.v.1964 (V. F. Eastop); DENMARK: Haderslev, on *Anthyllis*, 2 ♀ (*J. Maltbaek*).

Odontothrips meliloti Priesner

(Text-figs 16 & 17; Map 2)

Odontothrips meliloti Priesner, 1951 : 358. [No data given].

Odontothrips meliloti Priesner; Priesner, 1964 : 67.

The females of *meliloti* are very similar to *ignobilis* and can only be distinguished by the absence of lines of sculpture on the median area of the pronotum. The male

genitalia bear from three to four pairs of endothecal spines, the distal two or three pairs set apart from the basal pair, which are usually slightly larger (Text-figs 16 & 17).

No data accompanied the original description but Priesner (1964) records *meliloti* from Central and Southern Europe on *Melilotus albus* and *M. officinalis*.

MATERIAL EXAMINED. ENGLAND: Surrey, Ham, on *Melilotus*, 19 ♂, 15 ♀, 12.vi.1966 and vi.1970 (*L. A. Mound*); Somerset, on *Ononis repens*, 1 ♀; London, Stoke Newington, on *M. albus*, 2 ♂, 3 ♀, 25.viii.1946 (*G. D. Morison*); FRANCE: Bois d'Oingt, 10 ♂, 31 ♀, 5.vi.1927 (*O. John*); no locality given, on Papilionaceae, 1 ♂, 3 ♀, 8.ix.1927 (*O. John*); GERMANY: Harz, on *M. officinalis*, 3 ♂, 3 ♀, 24.vii.1951 (*H. von Oettingen*); S. Hessen, Zwingenberg, in flowers of *M. albus*, 3 ♂, 29.vi.1961 (*R. zur Strassen*) (SMF); CZECHOSLOVAKIA: Pourdrany, 1 ♂, 1 ♀, (*J. Pelikan*) (USNM); U.S.S.R.: Georgien, Tbilisi, 1 ♂, 12.viii.1968 (*R. zur Strassen*) (SMF).

Odontothrips meridionalis Priesner

(Text-fig. 18; Map 2)

Odontothrips ulicis var. *meridionalis* Priesner, 1919 : 122. Syntypes 7 ♂, 15 ♀, ALBANIA: Durazzo, flowers of *Spartium*, 18 & 27.v.1917 (Priesner coll.) [2 ♂, 6 ♀, syntypes examined].

Odontothrips meridionalis Priesner; Priesner, 1920 : 55.

Odontothrips meridionalis Priesner; Priesner, 1964 : 67.

Although the females of *meridionalis* are not readily distinguishable from *meliloti*, *karnyi* and *retamae*, the males are distinct in the chaetotaxy of the ninth abdominal tergite. The medial pair of setae are short and very stout (Text-fig. 18). The male genitalia (Text-fig. 18) bear from two to three pairs of stout endothecal spines, the distal pair set apart from the basal one or two pairs.

Odontothrips meridionalis is here recorded from Albania, Turkey and Cyprus, apparently feeding in the flowers of *Spartium*.

MATERIAL EXAMINED. Syntypes 2 ♂, 6 ♀, ALBANIA: Durazzo, on *Spartium*, 27.v.1917 (*Karny*) (Priesner coll.).

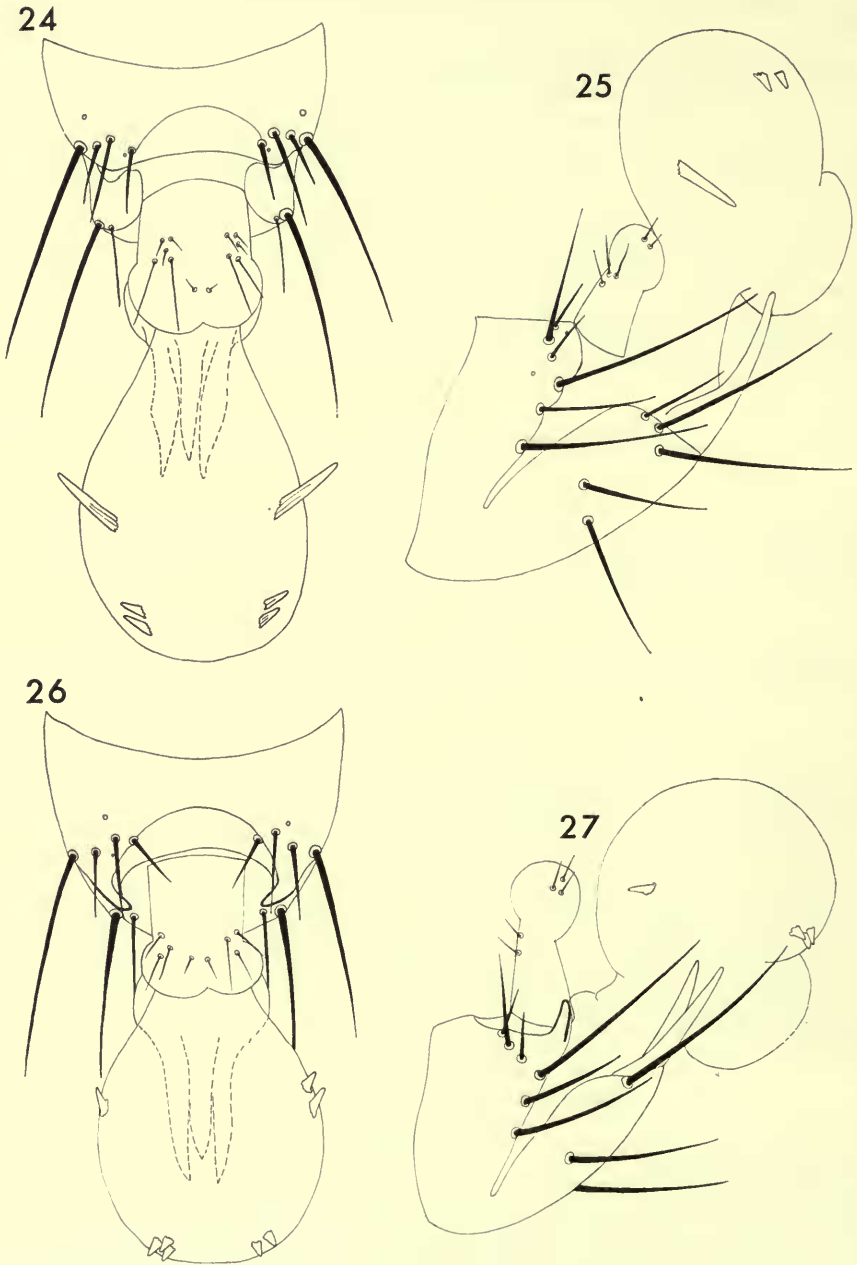
TURKEY: on *Spartium*, 1 ♂, 3 ♀, 2.vi.1949 (Priesner coll.). CYPRUS: Mt. Troodes, 9 ♀, vii.1937 (*G. A. Mavromoustakis*); Episcopi Forest, *Pinus maritima*, 1 ♀, iv.1954 (*G. A. Mavromoustakis*); no locality or host, 2 ♂, 9 ♀, (*G. A. Mavromoustakis*) (USNM).

Odontothrips moerens Priesner

Odontothrips moerens Priesner, 1927 : 64. Syntypes 4 ♀, GUINEA: Camayenne (Priesner coll.) [2 ♀ syntypes examined].

This species, like *pictipennis* (Text-fig. 1), has the base of the sixth antennal segment reduced. The fore tibiae each bear a single stout claw at the apex. The fore wings are almost entirely light brown and bear 4 + 11 + 2 setae on the upper vein and 14 to 18 on the lower vein. Antennal segment three is not markedly paler than segment two as in the Palaearctic *Odontothrips*.

O. moerens is known only from females collected in Guinea.



FIGS 24-27. Male genitalia and terminal abdominal segments: 24 & 25, *ulicis*, dorsal and lateral. 26 & 27, *cytisi*, dorsal and lateral.

MATERIAL EXAMINED. Syntypes 2 ♀, GUINEA: Camayenne (*Silvestri*) (Priesner coll.).

***Odontothrips ononidis* Bagnall**

(Map 2)

Odontothrips ononidis Bagnall, 1934b : 490-491. Syntypes 4 ♀, FRANCE: St. Georges de Didonne, on *Ononis natrix* (BMNH) [examined].

Described from females only, *ononidis* cannot at present be distinguished from large specimens of *meliloti*. The fore wings bear 4 + 15 + 2 on the upper vein and 19 on the lower vein.

MATERIAL EXAMINED. Syntypes 4 ♀, FRANCE: St. Georges Didonne, on *Ononis natrix*, 15.vii.1914.

***Odontothrips paraconfusus* Pelikan**

Odontothrips paraconfusus Pelikan, 1958 : 284-286. Holotype ♀, CZECHOSLOVAKIA: Cejc, on 'Steppenvegetation des xerothermen Lossbhanges', 8.vi.1950 (Akademie der Wissenschaften, Brno) [not examined].

This species is apparently similar to *meridionalis* and *meliloti* but may be distinguished by the presence of two small claws at the apex of the fore tibia.

***Odontothrips phaleratus* (Haliday)**

(Text-figs 11, 12 & 13; Map 4)

Thrips phalerata Haliday, 1836 : 447. Syntypes of both sexes, GREAT BRITAIN: borders of cornfield, ? *Lathyrus pratensis* (*A. Haliday*) (depository unknown) [not examined].

Odontothrips phalerata (Haliday) Amyot & Serville, 1843 : 643.

Physopus phalerata (Haliday); Uzel, 1895 : 112.

Odontothrips phalerata (Haliday); Karny, 1907 : 45.

Odontothrips anisomeris Bagnall, 1924 : 271. Syntypes of ? females only, ENGLAND: Surrey, Boxhill, on *Vicia* sp., May 1924; Yorkshire, Speeton, June 1924; Durham, Gibside, on *Lathyrus pratensis*; SCOTLAND: nr Perth, on *Vicia cracca*, June 1924 (All R. S. Bagnall) [18 ♀ from Durham & Surrey in BMNH examined]. [Synonymized by Bagnall, 1928 : 97.]

The females of *phaleratus* are very similar to *intermedius*; the males however may be distinguished from other species by the presence of median projections on the posterior margins of sternites IV to VII (Text-fig. 13). The male genitalia are bilobed and lack endothecal spines (Text-figs 11 & 12).

O. phaleratus apparently feeds in the flowers of *Lathyrus pratensis*, *Vicia cracca* and *V. sepium*. Priesner (1964) records this species from Great Britain and throughout Europe.

MATERIAL EXAMINED. Syntypes of *anisomeris*, 18 ♀, ENGLAND: Surrey, Boxhill, on *Vicia* sp. and Durham, Gibside, on *Lathyrus pratensis*, vii.1924 (R. S. Bagnall).

ENGLAND: Cheshire, Middlewood, on *Lathyrus pratensis*, 3 ♀, 6.vi.1920 (*H. Britten*); various localities, on *L. pratensis*, 6 ♂, 20 ♀, 1950-1060 (*G. D. Morison*); WALES: Llandona, Anglesey, sweeping, 2 ♂, 18.v.1961 (*V. F. Eastop*); SCOTLAND: Inverness-shire, Fort William, on *L. pratensis*, 1 ♂, 1 ♀ (R. S. Bagnall); various localities, on *L. pratensis*, 40 ♂, 72 ♀, 1950-1970 (*G. D. Morison*); FRANCE: Bois d'Alix, sweeping *Scirpus lacustris* (Cyperaceae), 2 ♀, 27.vii.1927 (*O. John*); Flecher, sweeping, 3 ♀,

21.viii.1927 (*O. John*); SWITZERLAND: Zurich, on *Fraxinus* (Oleaceae), 1 ♀, 12.viii.1966 (*V. F. Eastop*); Corinthia, Ossiach, 1 ♀, on *Vicia cracca*, 13.viii.1966 (*V. F. Eastop*); GERMANY: Hessen, Reidelbach, Taunus, on *Juniperinus communis* (Cupressaceae), 1 ♂, 5.v.1964 (*R. zur Strassen*) (SMF); YUGOSLAVIA: on *Triticum sativum* (Gramineae), 4 ♀, 3.vi.1958 (*N. Tanasijevic*); Lesie, nr Bledu, 1 ♂, 29.vii.1967 (*V. F. Eastop*).

Odontothrips phaseoli Kurosawa

Odontothrips phaseoli Kurosawa, 1941: 36-37, 43-44. Holotype ♂, CHINA: Manchuria, K-o-shan, in flower of red bean, 29.vii.1937 (*S. Kuwayama*) (National Institute of Agricultural Science, Tokyo) [examined].

The unique male of *phaseoli* apparently lacks tarsal hooks and tubercles and has a single fore tibial claw as in *phaleratus* and *intermedius*. Kurosawa states that *phaseoli* may be distinguished from *phaleratus* by the small tooth on the fore tibia as well as the absence of the projection on the sternites IV to VII of the abdomen.

Odontothrips phlomidinus Priesner

(Map 5)

Odontothrips phlomidinus Priesner, 1954: 50-51. Syntypes 4 ♀, PERSIA: Ardekan Mountains, in flowers of yellow *Phlomis* sp. (Priesner coll.) [2 ♀ examined].

This species is described from four females collected in Persia and these apparently lack small hooks or tubercles on the distal tarsal segment of the fore limb. The fore wings are pale except at the extreme apex as in *elbaensis*, from which it may be distinguished by the absence of lines of sculpture medially on the pronotum and abdominal tergites II to VIII.

MATERIAL EXAMINED. Syntypes 2 ♀, PERSIA: Ardekan Mountains, 9-10,000 ft, Northern Fars, on yellow flowers of *Phlomis* sp., (*Kuh Barn i Firuz*) (Priesner coll.).

Odontothrips pictipennis Hood

(Text-figs 1 & 3)

[*Euthrips phalerata* (Haliday); Morgan, 1913: 1-3. Misidentification.]

Odontothrips pictipennis Hood, 1916: 117. Syntypes 2 ♀, U.S.A.: Virginia, Great Falls, on *Azalea nudiflora*, May 1915 (*W. L. McAtee*) (USNM) [not examined].

Odontothrips morgani Bagnall, 1929: 49. Syntypes 2 ♀, U.S.A.: Florida, Quincy, on *Plantago virginica* (*H. F. Wilson*) (USNM) [not examined]. [Synonymized by Stannard, 1968: 329].

The name *pictipennis* was erected by Hood (1916) for specimens misidentified by Morgan (1913) as *phalerata*. The fore wings bear 4 + 8 to 11 + 2 setae on the upper vein and 12 to 15 setae on the lower vein. The base of the sense cone on the sixth antennal segment is reduced (Text-fig. 1). The male genitalia are bilobed and lack endothecal spines (Text-fig. 3).

This species is apparently indigenous to North America and is found in herbs such as violets and strawberries.

MATERIAL EXAMINED. U.S.A.: New York, Ithaca, on *Carya*, 2 ♀, 17.v.1938

(*J. D. Hood*) (USNM); Illinois, Mark, on strawberry blossom, 2 ♂, 29.iv.1948 (INHS); Illinois, Fountain Bluff, Gorham, 1 ♂, 30.v.1954 (*L. J. Stannard*) (INHS).

***Odontothrips retamae* Priesner stat. n.**

(Text-figs 22 & 23; Map 2)

[*Odontothrips karnyi* Priesner; Enderlein, 1929 : 42-44. Misidentification.]

Odontothrips karnyi var. *retamae* Priesner, 1933 : 192. Syntypes of ? both sexes, CANARY ISLANDS: on various Papilionaceae, April to May (*E. Titschack*) (Priesner coll.) [not examined].

Enderlein (1929) misidentified specimens from the Canary Islands ex *Retama* as *karnyi* Priesner. Priesner, when referring to these specimens and further material



MAP 3. Distribution of *Odontothrips ulicis* and *cytisi*.

collected by Titschack, proposed the name '*karnyi* var. *retamae* Enderlein (*in schedis*)'. Material from the series from which Priesner chose syntypes, and further specimens from various Papilionaceae in the Canary Islands and Morocco, have been examined and compared with *karnyi* sensu stricto. Although the females are not readily distinguishable, the males are distinct. *O. retamae* male genitalia bear six or more pairs of needle-like spines on the endotheca (Text-figs 22 & 23). Some of the females examined have a complete comb of microtrichia on the posterior margin of the eighth abdominal tergite as described by Priesner (1933), but this is very weakly developed medially. The fore wings bear 14 to 21 setae on the lower vein.

This species is here recorded from the flowers of various Papilionaceae, particularly of the tribe Genisteae, in the Canary Islands and Morocco.

MATERIAL EXAMINED. CANARY: Gran Canaria, Los Tilos, on *Cytisus* sp., 6 ♂, 14 ♀, 8.iv.1931 (*E. Titschack*) (Priesner coll.); Gran Canaria, San Mateo, 3,500 m, on *Adenocarpus foliosus* flowers, 3 ♂, 8 ♀, 7.iv.1960 (*R. zur Strassen*); Tenerife, Barr de Masca, on flowering *Retama monosperma rhodorhizoides*, 9 ♂, 15 ♀, 20.iii.1964 (*R. zur Strassen*); Tenerife, Las Canadas, 2,250 m, on flowering branches of *Spartocytisus nubigenus*, 10 ♂, 15 ♀, 17.iv.1963 (*R. zur Strassen*); MOROCCO: Aknoul, on legumes, 4 ♂, 15 ♀, 6.iv.1960 (*Drea & Kramer*) (USNM).



MAP 4. Distribution of *Odontothrips phaleratus* and *intermedius*.

Odontothrips ulicis (Haliday)

(Text-figs 6, 24 & 25; Map 3)

Thrips ulicis Haliday, 1836 : 446. Syntypes of ? both sexes, GREAT BRITAIN: ex flowers of *Ulex europaeus*, *Crocus* and corn [lost].

Odontothrips ulicis (Haliday) Amyot & Serville, 1843 : 643.

The females of this species are not readily distinguishable from *cytisi*, although the hind vein of the fore wing normally bears a row of 17 to 23 setae, whereas *cytisi* has 14 to 18 setae. The males of *ulicis* lack the stout processes on the postero-lateral margin of the ninth abdominal tergite found in *cytisi* and other species of *Odontothrips*. The male genitalia bear three pairs of endothecal spines (Text-figs 24 & 25), with the basal pair nearly twice as long as the distal two pairs.

O. ulicis is a British species, also known from a single record in France, and feeds in the flowers of *Ulex europaeus*.

MATERIAL EXAMINED. ENGLAND: Northumberland, Ovingham, on *Ulex europaeus*, 2 ♂, 4 ♀, 15.iv.1916 (*R. S. Bagnall*); Surrey, Mitcham Common, *Ulex* flowers, 6 ♀, 25.iv.1965 (*B. R. Pitkin*); Hants, nr Brockenhurst, on *Ulex*, 3 ♂, 4 ♀, 16-19.iv.1965 (*B. R. Pitkin*); Devon, Salcombe, on *Ulex*, 11 ♀, 27.1965 (*L. A. Mound*); SCOTLAND: Aberdeen, Bucksburn, *Ulex* flowers, 4 ♀, 15 ♂, 24.v.1966 (*L. A. Mound*);



MAP 5. Distribution of the *aemulans* group.

various localities on *U. europaeus*, 19 ♂, 9 ♀, 1950-1964 (G. D. Morison); Dyce, Gorse, 4 ♀, vi.1968 (L. A. Mound). GREAT BRITAIN; 58 ♂, 117 ♀ (G. D. Morison); IRELAND: Roscommon, Ballymoe, on *Ulex*, 2 ♀, 12.vi.1968 (B. R. Pitkin).

Odontothrips viciae Priesner

Odontothrips viciae Priesner, 1951 : 356. Syntypes 4 ♀, ISRAEL: Palestine, Zichron, on *Vicia* sp. (Priesner coll.) [2 ♀ examined].

This species of *Odontothrips* is related to *aemulans*, *confusus*, *dorycnii* and *edentulus* but appears to be unique in that the fore tarsus has a curved terminal claw. *O. viciae* is known only from the type-series of four females ex *Vicia* from Israel.

MATERIAL EXAMINED. Syntypes 2 ♀, ISRAEL: Palestine, Zichron, on *Vicia* sp., 22.ii.1938 (E. Rivnay) (Priesner coll.).

Odontothrips vuilletia Bagnall

(Map 2)

Odontothrips vuilletia Bagnall, 1934b : 489-490. Holotype, FRANCE: Pyrenees, Cauterets, on *Astragalus monospeulanus*, 25.v.1913 (M. Vuillet) [lost].

The unique female on which this species was described has apparently been lost (Mound, 1968) but in the original description Bagnall states that *vuilletia* was related to *ignobilis*, a species which is known to occur in the Pyrenees.

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